



# Economic valuation of sustainable land management strategies

**“Interdependencies between Land use and Climate Change – Strategies for a sustainable land use management in Germany”  
CC-LandStraD, Module A**

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- Introduction
- Aims of the project
- Research approach: Ecosystem Services
- Preliminary results

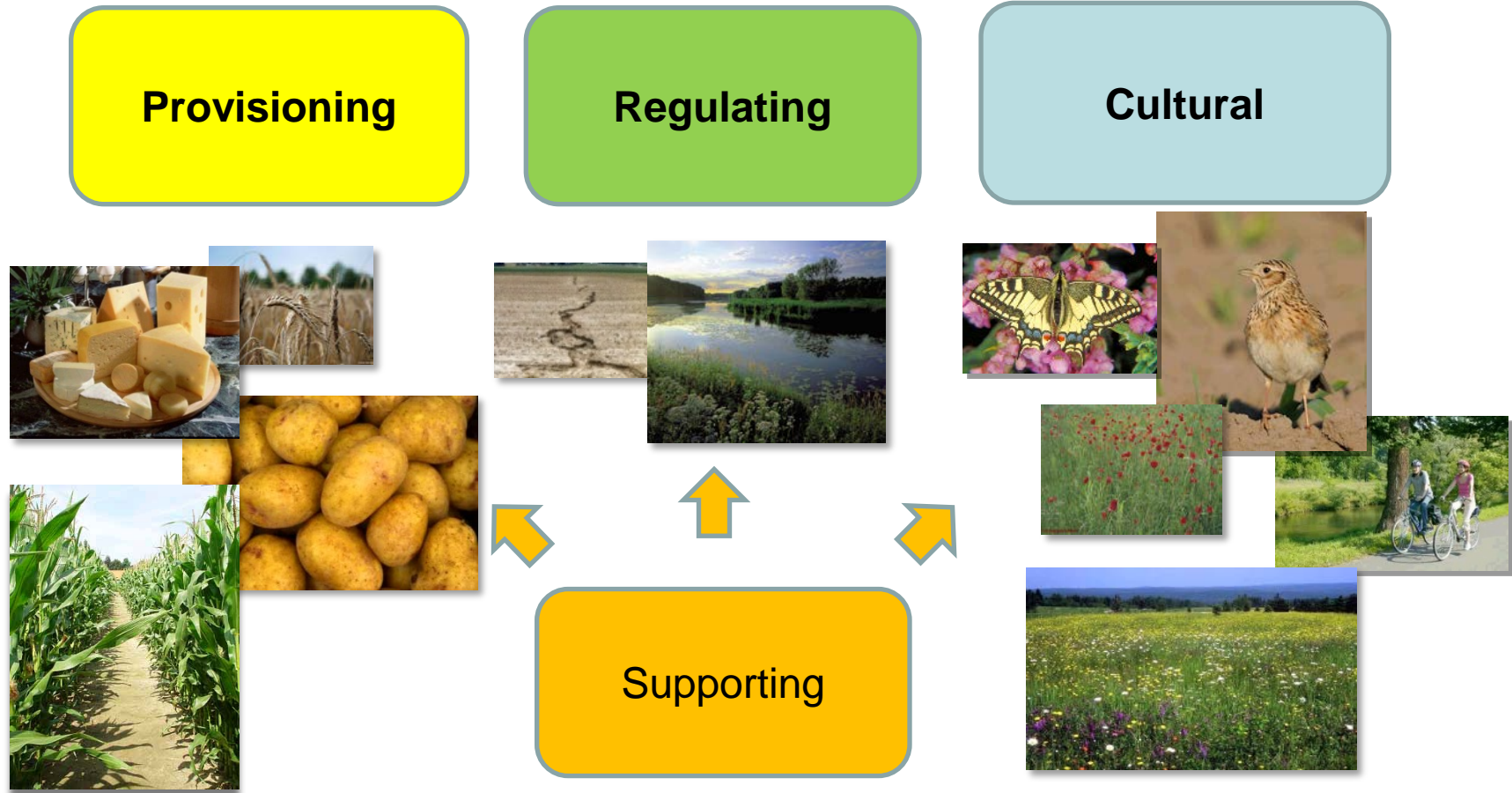
- CC-LandStraD: Research project within the funding programme “Sustainable Land Management” of the Federal Ministry of Education and Research (BMBF)
- Module A: “Interactions between land management, climate change and ecosystem services”
- Part of the BMBF framework programme “Research for Sustainable Development” (FONA)



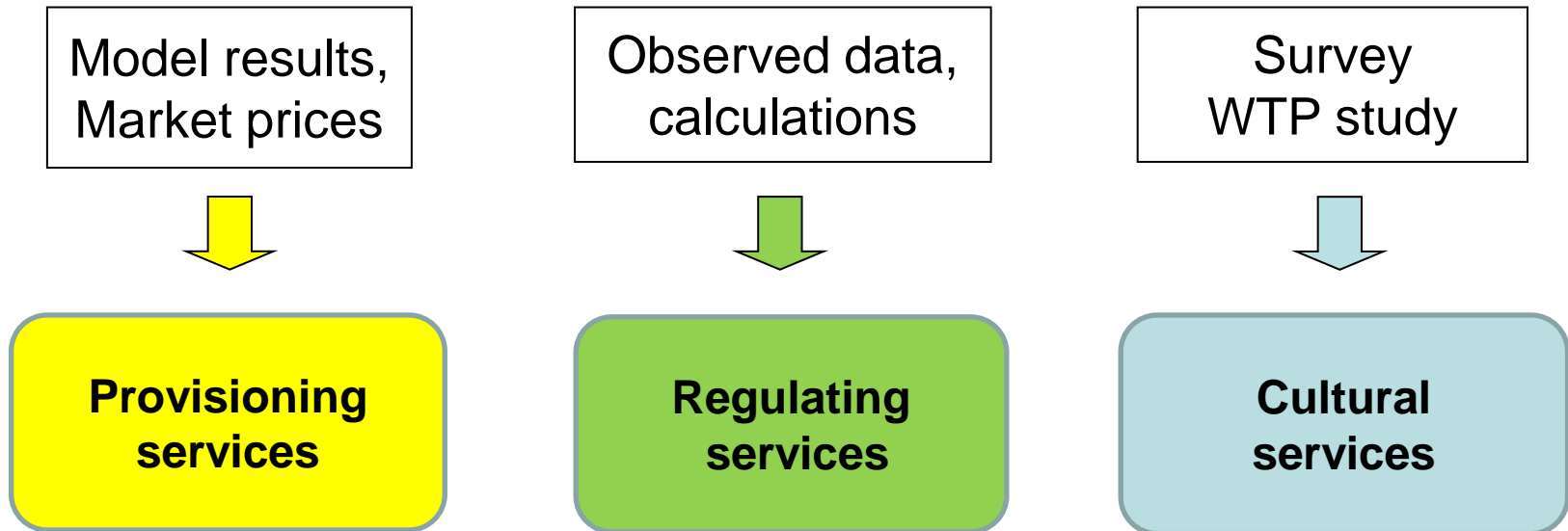
- Changes in land use have effects on GHG-emissions, nutrient fluxes, biodiversity, etc.
- Agriculture has to adapt to climate change
- Climate mitigation and adaptation has ecological and economic effects
- Value of agricultural landscapes often underestimated because of insufficient market prices

- Economic valuation of sustainable land use strategies which are adjusted to climate change
  - Integration of results from the subprojects (model RAUMIS, resolution on county level)
- Economic valuation of further value dimensions e.g. with representative survey
  - z.B. aesthetic landscapes for recreation, biodiversity, land consumption
- Scope of the project: Germany plus two focus regions
- Comparison of alternative land use options
- Provision of information for political decisions

## Ecosystem Services



## Cost-benefit analysis and economic valuation



- Expert monitoring of national and regional stakeholder workshops (September 2012)
- Focus group discussions (November 2012)
- Development of questionnaire for valuation of sustainable land use options (May 2011 - Januar 2013)
- Pretest finished (February 2013)
- Revision of questionnaire for main study (March/April 2013)
- Coopertion with BMBF-Projekt „Sustainable Landmanagement in the North German lowlands“(NaLaMa-nT part of Modul B)



- Introduction to land use
- Choice Experiment: Valuation of land management options via choice of bundles of preferred landscape characteristics (selected ecosystem services affected by potential land use measures)
- Non-monetary valuation of landscape images
- Perception and attitudes towards biodiversity and agriculture
- Acceptance/refusal of the landscape characteristics and perceived values, ethical reasoning
- Recreation habits
- Demographic characteristics

- Survey period: March to April 2013
- N = 10.000 Interviews expected (joint project)
- N = 3.000 Interviews IÖW subsample (27,000 choice observations)
- Average length per interview: 28 minutes
- 11% drop outs; 89% finished the questionnaire completely

	Sample IÖW 1	Sample IÖW 2	Sample TU 1	Sample TU 2	Sample vTI 1	Sample vTI 2
<b>Core attribute 1</b>	X	X	X	X	X	X
<b>Core attribute 2</b>	X	X	X	X	X	X
<b>Flexible Att 1</b>	X		X		X	
<b>Flexible Att 2</b>	X		X		X	
<b>Flexible Att 3</b>	X		X		X	
<b>Flexible Att 4</b>		X		X		X
<b>Flexible Att 5</b>		X		X		X
<b>Flexible Att 6</b>		X		X		X
<b>Price</b>	X	X	X	X	X	X

	Sample IÖW 1	Sample IÖW 2	Sample TU 1	Sample TU 2	Sample vTI 1	Sample vTI 2
<b>Core attribute 1</b>	Share of forest	Share of forest	Share of forest	Share of forest	Share of forest	Share of forest
<b>Core attribute 2</b>	Field size and size of forested areas	Field size and size of forested areas	Field size and size of forested areas	Field size and size of forested areas	Field size and size of forested areas	Field size and size of forested areas
<b>Flexible Att 1</b>	Biodiversity within agricultural land		Quality of lakes and rivers		Forests with under storey	
<b>Flexible Att 2</b>	Share of maize		Share of meadows and grazing land		Share of conifer trees	
<b>Flexible Att 3</b>	Share of meadows and grazing land		Share of broadleaf trees		Age of forest	
<b>Flexible Att 4</b>		Agricultural land with high nature value		Biodiversity in landscapes		Biodiversity within forest
<b>Flexible Att 5</b>		Share of hedges		Mixed orchards		Not used forest areas
<b>Flexible Att 6</b>		Land consumption		Animals on meadows		Share of alien trees
<b>Price</b>	X	X	X	X	X	X













# Survey design – Choice set example

44% 

Wenn nur die folgenden Möglichkeiten für die Entwicklung der Landschaft im **Umkreis von bis zu 15 Kilometern um den Ort, an dem Sie wohnen**, zur Verfügung stünden, welche würden Sie wählen?

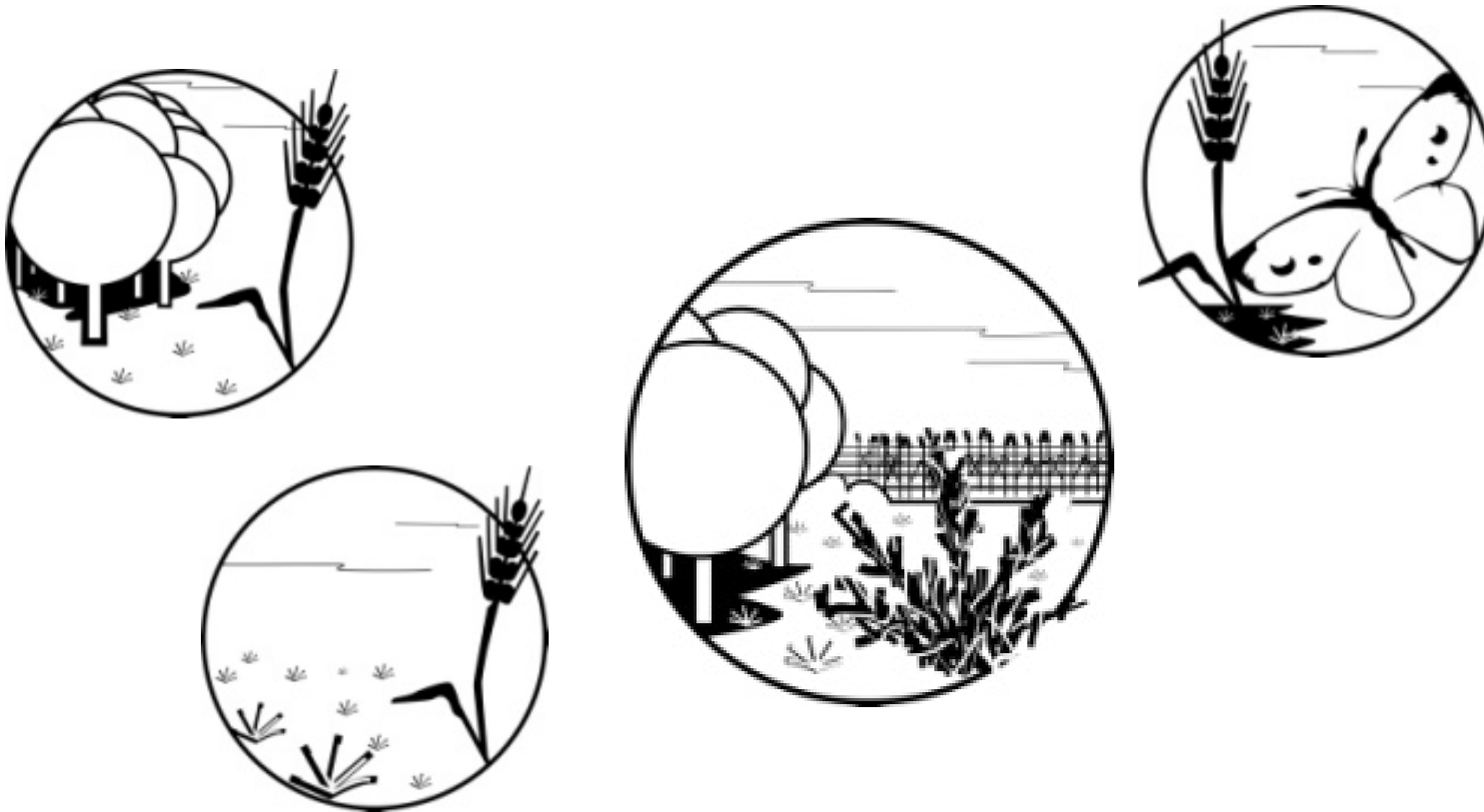
Wenn Sie in einer großen Stadt wohnen, denken Sie bitte an die Umgebung dieser Stadt.

Bei dieser Frage können Sie nur eine Antwort geben.

SET 7	Landschaft A	Landschaft B	Landschaft C
 Anteil Wald an der Landschaft 	10% höher	10% niedriger	wie heute
 Größe einzelner Felder und Waldstücke 	halb so groß	doppelt so groß	wie heute
 Artenvielfalt auf landwirtschaftlichen Flächen 	leicht erhöhen (85 Punkte)	deutlich erhöhen (105 Punkte)	wie heute
 Maisanteil 	max. 30% der Ackerfläche	max. 70% der Ackerfläche	wie heute
 Anteil von Wiesen und Weiden 	50% Wiesen und Weiden	25% Wiesen und Weiden	wie heute
 Finanzieller Jahresbeitrag zum Landschaftsfonds 	80 €	10 €	0 €
<input type="checkbox"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

ICH WÄHLE...

# First results



## Base model 1

Attribute [Landscape characteristic/ ecosystem service]	Level [Quality of provided ecosystem service]	Willingness to pay [€/year/ person]
Share of forest	1.) 10 % lower 2.) <b>as today</b> 3.) <b>10 % higher</b>	80,28 ***
Biodiversity within agricultural land	1.) as today 2.) <b>increase slightly (85 points)</b> 3.) <b>increase strongly (105 points)</b>	25,76 ***
Share of maize	1.) <b>as today</b> 2.) <b>30% of arable land</b> 3.) 70% of arable land	- 32,10 ***

\*\*\*  $p = 0,01$ ; (N=503 interviews; sample IÖW 1; 4527 observations)

preliminary results – not to be quoted !

## Item

- I 1: Today's agriculture leads to degradation of habitats, wildlife and plant species.
- I 2: Fertilizers and crop pesticides decrease soil fertility and product quality.
- I 3: To apply chemicals in agriculture is to act against nature.
- I 4: The contamination of groundwater by fertilizers is worse than people want to have it true.
- I 5: In media coverage, agriculture is overstated as causer of environmental problems.
- I 6: Farmers are the best nature conservationists, even if they make sometimes mistakes.
- I 7: Fertilizers and crop pesticides do not have any effects. They increase product quality.
- I 8: Application of chemicals in agriculture makes sense if the benefits exceed the costs.



## Influence of attitudes on preferences and willingness to pay

Item	Influence on attributes ..
I 1: Today's agriculture leads to degradation of habitats, wildlife and plant species.	Field size and size of forested areas, share of hedges at field margins and margins of grasslands, land consumption, agricultural areas with high nature value
I 2: Fertilizers and crop pesticides decrease soil fertility and product quality.	Field size and size of forested areas, share of hedges at field margins and margins of grasslands, land consumption
I 3: To apply chemicals in agriculture is to act against nature.	Share of hedges at field margins and margins of grasslands
I 4: The contamination of groundwater by fertilizers is worse than people want to have it true.	Share of hedges at field margins and margins of grasslands, land consumption, agricultural areas with high nature value
I 5: In media coverage, agriculture is overstated as causer of environmental problems.	Land consumption, agricultural areas with high nature value
I 6: Farmers are the best nature conservationists, even if they make sometimes mistakes.	Agricultural areas with high nature value, land consumption
I 7: Fertilizers and crop pesticides do not have any effects. They increase product quality.	Share of forest and agricultural land, agricultural areas with high nature value, land consumption
I 8: Application of chemicals in agriculture makes sense if the benefits exceed the costs.	Share of forest and agricultural land, field size and size of forested areas, agricultural areas with high nature value, land consumption

preliminary results – not to be quoted !



## Influence of attitudes on preferences and willingness to pay

Item	Influence on attributes ..
I 1: Today's agriculture leads to degradation of habitats, wildlife and plant species.	<ul style="list-style-type: none"><li>• Field size and size of forested areas,</li><li>• Share of hedges at field and grassland margins,</li><li>• Land consumption,</li><li>• Agricultural areas with high nature value</li></ul>

The stronger respondents agree to this item the higher probability of preference for the attributes ...

- share of hedges at field margins and margins of grasslands,
- and agricultural areas with high nature value

WTP for biodiversity is higher than in base model:

- Hedges - interacting item 8,36 €
- High nature value - interacting item 9,95 €



(Results for N=497 Interviews; 4473 observations) preliminary results – not to be quoted !

## Economic valuation of land management strategies for climate change mitigation and adaptation ...

- High potential for identification of land use options which are preferred/accepted by the people
- Reveals benefits and costs of an increase or decrease in ecosystem service qualities
- Provides information for political decision makers in terms of preferred land use options and affected ecosystem services



Foto: Juliane Specht

# Thank you!

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Publications related to project :

Rajmis, S., Hirschfeld, J., Fick, J., Gömann, H. (2012): CC-LandStraD: Wechselwirkungen zwischen Landnutzung und Klimawandel – Teilprojekt Ökosystemdienstleistungen der landwirtschaftlich genutzten Landschaft und Ansätze zur ökonomischen Bewertung. In: Korn, H., Feit, U., Schliep, R. (Red.); Bundesamt für Naturschutz (Hrsg.) Biodiversität und Klima - Vernetzung der Akteure in Deutschland VIII - Ergebnisse und Dokumentation des 8. Workshops. BfN-Skripten 307, Bonn-Bad Godesberg, 99-102.

Schaller, M., Beierkuhnlein, C., Rajmis, S., Schmidt Th., Nitsch H., Liess, M., Kattwinkel, M., Settele, J. (2012): Auswirkungen auf landwirtschaftlich genutzte Lebensräume. In: Mosbrugger, V., Brasseur, G., Schaller, M. und Stribny, B. (Hrsg.) Klimawandel und Biodiversität - Folgen für Deutschland. WBG, Darmstadt, S. 222-259.